



April 2004

NASA's Space Partnership Development

Partnering with industry to explore space and improve life

NASA's Space Partnership Development (SPD) Office is industry's link to conducting research and developing products through space exploration. SPD facilitates partnerships between industry, universities and government through its Research Partnership Centers (RPCs). Located mostly at universities across the country, there are 15 RPCs with which a business can partner to create new products and services from space-based research. Through such collaborations, industry supports NASA's mission by developing knowledge and technologies that help humans live and work in space and benefit people on Earth.

Long-term human space travel for future moon and Mars exploration requires research to ensure human health and safety. Priorities for such research include:

- Human health (e.g., treatments)
- Human Life Support (e.g., systems)
- Radiation
- Biological and Physical Research on the Moon and Mars
- Low Gravity Research for Exploration

Current SPD research thrusts to support long-term space travel include Biological and Physical Interfaces, Space Resources and Manufacturing, Spacecraft Technologies and

Human Support Technologies. Companies from many industry sectors can participate in the NASA space exploration program:

- Advanced Materials
- Agriculture
- Biotechnology & Medical Systems
- Communications
- Electronics & Power
- Spacecraft Technology

How and Why Participate

Industry may participate with SPD in many ways. Each RPC offers different avenues and levels of participation, suiting each company's needs. A company may choose to partner with an RPC to share information, collaborate with other companies in ground or space research, or perform dedicated research. Visit <http://spd.nasa.gov> to learn more about RPC participation.

RPCs have worked with their industrial partners to fly scores of experiments on the Space Shuttle and International Space Station. Almost one-third of all the experiment payloads currently on the International Space Station are associated with the SPD program. The RPC's strength is also in its leveraging: for each dollar of NASA SPD funding, industry contributes more than \$2 (cash and in-kind).

What RPCs Offer Industry

- Ground- and space-based research
- Opportunities for innovation
- Potential new markets, businesses and products
- Opportunity to contribute to national goals
- Collaboration with other companies
- NASA and University expertise
- Access to space and NASA facilities

RPC FACTS (Fiscal Year 2003)	
Number of RPCs	15
RPC Affiliates	
– Industrial	166
– Academic	62
– Government	47
Leveraging	
– SPD Funding	\$31.5M
– Non-SPD Funding*	\$83.7M
– Ratio: Non-SPD to SPD Funding*	2.65
Commercial Activity	
– Spin-Off Firms	3
– Patents Filed	48
– Patents Awarded	15
Publications	
– Refereed	222
– Non-Refereed	75
Degrees Earned	
– Bachelors	25
– Masters	33
– Ph.D.	23

* includes cash and in-kind support from industry, universities, & other government agencies

SPD Origin

Congress amended the Space Act of 1958, directing NASA to "seek and encourage, to the maximum extent possible, the fullest commercial use of space." The SPD program and the Research Partnership Centers were established in 1985 as a result of this change.

SPD Mission

To further NASA's mission by establishing industry-university-government partnerships making use of NASA assets, academic expertise and industry market knowledge and investment.

"Our collaboration with NASA not only puts our researchers in the forefront of science, but also gives us the opportunity of being first in our field to develop major new technologies and products."

Ray Lam, Natural Products Research
Bristol-Myers Squibb

"We've been involved in space-based research with BioServe for over a decade and the investment has been well worth it."

Jim Carbonari, CEO
PentaPure

Space Partnership Development Accomplishments

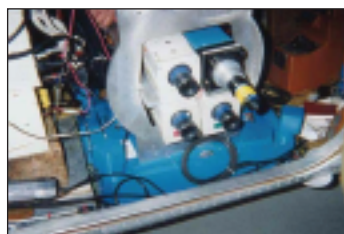
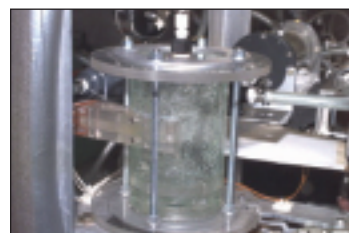
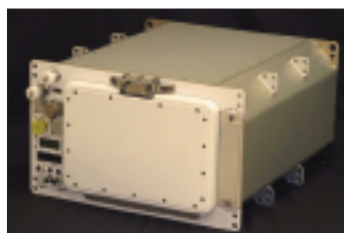
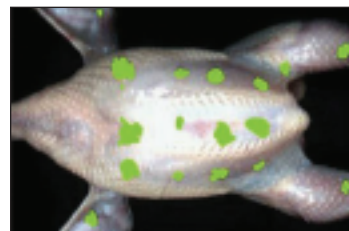
Research Partnership Centers represent an extensive network of industry, government and academic partners performing space research to benefit exploration and life on Earth. This network includes small businesses, as well as many of the largest research and development companies in the world. Their work has resulted in new businesses, products and sales. SPD program research also has led to many product patents, and extensive publication in refereed and non-refereed journals. The centers have helped develop the next generation of explorers through the support of university undergraduate and post-graduate student researchers.

Products to improve life on Earth:

- an anthrax-killing device, developed from technology used to grow plants on the ISS;
- light-emitting diode arrays used to grow plants in space have been adapted to treat brain tumors and hard-to-heal wounds;
- new, artificial bone replacement materials that are longer lasting and structurally similar to real bone;
- a mobile surgical unit used to perform presurgical diagnostic screenings on patients in remote locations;
- hyperspectral sensors that can be used to detect food contaminants as well as forensic materials; and
- water purification products used for disaster relief and sport water bottles.

Products to benefit space exploration:

- advanced star tracker that produces highly accurate and reliable attitude determination;
- HDMAX™ camera with eight times the resolution of current HD TV systems for safety inspection and experiment monitoring;
- hardware for use with payloads which require thermal control between the ranges of -20°C to 48.5°C;
- plant growth facility with the capability to produce crop specimens in space; and
- phase separator with applications in regenerative life support for long duration missions, zero gravity propellant transfer, water/oxygen separator for fuel cells and high power energy conversion systems.



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<http://spd.nasa.gov>